

**EVAPORATED LaAlO<sub>3</sub> FILMS FOR GATE DIELECTRICS**

**ABSTRACT**

A gate dielectric containing LaAlO<sub>3</sub> and method of fabricating a gate dielectric contained LaAlO<sub>3</sub> produce a reliable gate dielectric having a thinner equivalent oxide thickness than attainable using SiO<sub>2</sub>. The LaAlO<sub>3</sub> gate dielectrics formed are thermodynamically stable such that these gate dielectrics will have minimal reactions  
5 with a silicon substrate or other structures during processing. A LaAlO<sub>3</sub> gate dielectric is formed by evaporating Al<sub>2</sub>O<sub>3</sub> at a given rate, evaporating La<sub>2</sub>O<sub>3</sub> at another rate, and controlling the two rates to provide an amorphous film containing LaAlO<sub>3</sub> on a transistor body region. The evaporation deposition of the LaAlO<sub>3</sub> film is performed using two electron guns to evaporate dry pellets of Al<sub>2</sub>O<sub>3</sub> and La<sub>2</sub>O<sub>3</sub>. The two rates for evaporating  
10 the materials are selectively chosen to provide a dielectric film composition having a predetermined dielectric constant ranging from the dielectric constant of an Al<sub>2</sub>O<sub>3</sub> film to the dielectric constant of a La<sub>2</sub>O<sub>3</sub> film. In addition to forming a LaAlO<sub>3</sub> gate dielectric for a transistor, memory devices, and information handling devices such as computers include elements having a LaAlO<sub>3</sub> gate electric with a thin equivalent oxide thickness.

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